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For the American Medical Intelligencer.

## Art. I.—MEDICAL PROFESSION IN CHINA.

Macao, August 18th, 1840.

*To Professor Dunglison.*

My dear Sir,—Presuming that as a friend to science and a promoter of its best interests, you might be interested in the state of the medical profession in China, and in the means adopted to instruct the Chinese in its principles, I send you a chapter of the Canton Christomathy, treating upon the subject of medicine, and an article prepared for the August number of the Chinese Repository by one of the officers of the missionary hospital, William Lockhart, Esq., M. R. C. S., exhibiting in some degree the knowledge of human anatomy possessed by the members of the medical corps in China. The subject will be further examined by us as we improve our knowledge of the language, and thus become more able to examine into the mysteries of Chinese medicine.

Enough, however, is known to disprove the assertion of a late writer, that "anatomy is an art unknown to Chinese physicians." It is nevertheless true that their information on the structure of the human frame is of no use to them in their practice, which consists chiefly in feeling the pulse, by which they determine the sickness. It would occupy many volumes to enter into a detailed account of the doctrines of the pulse, as taught by the Chinese writers on medicine. It is enough for us to know that they enumerate twenty-four different kinds of pulses, with their sub-divisions. Du Halde gives an epitome of the doctrines in his justly celebrated History of China, a translation of which was published in London in 1741.

These sapient disciples of Æsculapius almost equal the celebrated nosologists Cullen and Good, when they divide diseases into more than one thousand different kinds.

Let it be our aim to impart to them the more rational principles which govern us in our efforts to cure disease; then may we hope to spread far and wide the blessings which a Sydenham, a Larrey, or a Rush have diffused among their countrymen.

I have the honour, my dear Sir, to be yours, most respectfully,

Wm. Beck Diver.

### *Section First.*

### CONVERSATION ON MEDICINE.

1. What is the object of medical science?

It is to protect and preserve human life; hence it is necessary to know the nature of medicines, and the origin of diseases, together with the laws of treating them.

2. In what estimation is medicine held by the Chinese?

Medicine, designed to protect and prolong human life, has been called the benevolent art; and therefore is esteemed second only to the literary profession.

3. What is requisite in order to enter the profession?

You must seek for some celebrated practitioner, and become his pupil. In order to search into the principles of the science, and investigate the nature of remedies, select several medical authors for study, and peruse them until the principles are understood, and your knowledge is extensive; then you may read all the professional writers.

4. Are there any medical schools?

There are none in all the country; but at Peking there has been established a great medical college, and persons most thoroughly acquainted with medicine, and possessing an unblemished character, are after examination selected to enter the college, to fill its offices, and to practise therein. This great medical college has one principal director, and also one of a secondary, and another of a subordinate, rank, who superintend and examine the treatment of all the nine classes of diseases, and who direct all those who are entrusted with the business of the institution. Fifteen members of the college hold the rank of imperial physicians; thirty are overseers; forty are masters of medicine; and thirty rank as bachelors of medicine.

5. Who are some of the ancient eminent physicians?

The earliest were the emperors I'm and Wóng; next were K'ipák and Pákkò; and after them followed Mòhám, Ts'óngkung, Pintséuk, Wát'ò, Shunyû I', Wóng Shukwó, Ch'an Kwai, Hû Háutsung, Lí Shíchan; and also there were Chéung Chungking, Lau Shauchan, Lí Tungún, and Chû Tánk'ai, designated the four great and renowned physicians, who are even to this day much esteemed.

6. What are the best medical books?

The medical books cannot be severally considered; for every branch having its own authors, the doing so would only perplex the student. But for matter and method none equal the "Golden Mirror of Eminent Authors," and the "Comparative Compendium of Medical Writers."

7. How are diseases to be treated?

Always in treating diseases, whether they be internal or external, it is necessary in all cases to examine into the origin of the malady by inspection, by hearing, by interrogation, and by feeling the pulse.

8. Are there any hospitals for gratuitous practice?

Sometimes only there have been such.

9. At the apothecary's shop, in what manner are medicines sold, and how are they compounded?

Medicines, in a crude or prepared state, are purchased from all the provinces, and are either cut in pieces or preserved whole; and then they are measured out according to recipes, sometimes several kinds being compounded together; at others they are formed into ointments, pills, or powders, or steeped in spirits, and retailed in small quantities.

10. Does the penal code speak on this subject?

It speaks respecting physicians: "On injuring or killing persons by an unskilful practitioner," it thus decrees:

"Whenever an unskilful practitioner, in administering medicines, or using the puncturing needle, proceeds contrary to the established forms, and thereby causes the death of a patient, the magistrate shall call in other practitioners to examine the medicine or the wound, and if it appears that the injury done was unintentional, the practitioner shall then be treated according to the statute for accidental homicides, and shall not be allowed any longer to practice medicine. But if designedly he departs from the established forms, and deceives in his attempts to cure the malady, in order to obtain property, then according to its amount he shall be treated as a thief;

and if death shall ensue from his malpractice, then, for having thus used medicine with intent to kill, he shall be beheaded."

*Notes and Explanations.*

Medical science among the Chinese is in a very different state from that to which it has been advanced by modern practitioners in the west. It is where it was centuries ago: many diseases are regarded as incurable for which modern improvement has devised sure and speedy remedies. However, a more thorough investigation of the healing art, as understood by this people, may yet be of essential advantage to the science. It would probably be found, were the subject sufficiently examined, that the Chinese, as a nation, enjoy as good a degree of health, and on an average attain to as great an age, as any other people.

1. Preventive medicine, or *hygiene*, is a part of the benevolent art to which the Chinese pay great, but evidently not too much, attention; they say, truly, "Prevention is better than cure." The words *pò ts'ün*, as here used, are quoted from an imperial work, and indicate that the primary object of the science is to preserve and protect men from illness, rather than to heal their diseases, or to cure their maladies.

3. The phrase *i li*, or institutes of medicine, may be understood as comprising the general physiological, hygienic, and therapeutical relations of medicine, or the general and fundamental principles of the science.

5. I'm tai—Yen te, or the emperor Yen—is otherwise called Shannung, the divine husbandman, and the father of medicine. The emperor Wóng was his successor, and with him K'ípák was cotemporary. Pákkò lived about the same time. Mòhám, Ts'óngkung, with his pupil Píntséuk, lived prior to our era. Wát'ò is the physician said to have laid bare and scraped a bone of the hero Kwán, and so saved him from the fatal effects of a poisoned arrow: one is now styled a god of medicine, and the other of war. Popular tradition says that Wát'ò was decapitated at the instigation of Tsò Tsò, for having proposed to trepan that famous general with a view to cure him of an affection of the brain. Shunyū I' lived near the same time. Wóng Shukwó is known by his work on the pulse, epitomised in Du Halde. Ch'an Kwai is said to have removed diseased viscera. Of Lí Shíchan, who flourished in the reign of Mánlik, of the Ming dynasty, it is enough to say he is the compiler and principal author of the *Pún ts'ò*. There are also many other physicians, ancient and modern, who are highly celebrated.

6. Besides these, there are many others in high repute and extensively used. In the sixth volume of the *Pún ts'ò*, there is a list of 276 medical works quoted by Lí Shíchan; and likewise a list of 440 miscellaneous works, historical, biographical, &c., from which he made extracts for his materia medica.

10. This law, here quoted, forms the 297th section of the penal code, and seems to be the only reference made therein to the medical profession. For engaging in the practice of medicine no license is required; but the physician must beware lest his medicines fail to have the desired effect.

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*Description of a Chinese Anatomical Plate, illustrative of the Human Body, with explanations of the terms.*

The plate, the explanation of which is the object of the present paper, is copied from the *Kashira Gaki zoü ho*, or First Book in Instructing Youth, an encyclopediac Japanese work, containing descriptions, not only of anatomy, but of dress, houses, arts, mythology, &c. Figures of a similar kind are also found in various Chinese medical works. One is contained in the *Luy King*, a book consisting of twenty volumes, a collection of writings on several branches of medical science, anatomy, physiology, practice of surgery and medicine, and hygiene. A similar figure forms one of a series of four

large anatomical plates (about three feet long) issued by the imperial medical college. It is possible that this Japanese drawing may have been copied from a Chinese original, but it is much superior in mechanical execution to the Chinese plates. The Chinese are by no means ignorant of some of the general principles of anatomy and physiology, though many of their ideas are so much obscured by what is frivolous and absurd, as to be almost entirely undeserving of attention. This is strikingly exemplified in their endless disquisitions on the *yin* and *yang*, which foreigners have considered as the female and male principles of nature. Almost every square inch of the external surface of the body has its peculiar name; and in all their series of anatomical figures, there are some individual plates appropriated to this extreme marking out of the surface, until the whole body is covered with names. In medical practice, they apply their external remedies to these various spots; and Chinese may frequently be seen with small patches of some adhesive plaster on various parts of the body, on the principle that when there is pain in any particular part of the body, a plaster must be applied on one of these arbitrary spots; these are the places where moxas and cauteries are to be applied, and they are called *heue*. All the prominent parts of the surface, as the shoulder, elbow, trochanter, and knee, are said to be under the influence of the *yang*, or male principle; while the depressions of the surface, as the armpit, bend of the arm, groin, and ham, are under the influence of the *yin*, or female principle!

They have some knowledge of the bones, and of their general shape and position, though they are not at all particular as to the way in which they are joined together, and make sad havoc among what anatomists call the processes of the bones. As to the muscles, they appear to know nothing about them or their use in the system, since they make no other remark upon the muscular substance than giving it the general term of *juh*, flesh. They call the tendons *kin*, and suppose that the strength of the bodily frame depends upon them; it appears to be applied also indiscriminately to all the fibrous cords. In regard to the blood-vessels, no clear distinction is made between the arteries and veins; there are certainly two names, *king* and *lo;* as also the names *king muh* and *lo muh*, given to these vessels. It would appear that *king* is merely the name of the straight vessels, and *lo* of the lateral branches; for in the *Nan King* it is said, "*king chih hing chay*, the *king* are the vessels that follow a straight course; and *lo pang hing chay*, the *lo* are those that have a lateral direction." Whether there be any other names given to the blood-vessels is uncertain; but the consideration of this subject, as also of the nerves, must be deferred for the present.

In regard to the shape and position of the viscera they have some general ideas, but these ideas are far from being correct. It appears as if some person had seen an imperfect dissection of the interior of the body, and then had sketched from memory a representation of the organs, filling up parts that were obscure out of his own imagination, and portraying what, according to his opinion, the parts ought to be, rather than what they in reality are.

The following is the description of the plate, beginning at the top; the explanation of the characters is drawn from Chinese sources:

The title of the plate is *Tsang Foo*, the organs of the human body. These organs are divided into two classes. The *tsang*, or parenchymatous viscera, of which there are five, viz. the lungs, heart, liver, spleen, and kidney; *foo*, or membranous viscera, of which there are six, as the large and small intestines, the stomach, bladder, gall-bladder, and the *san tseaou*, the three passages.

*Naou*, the brain.

*Suy hae che yin*, reservoir of the marrow, and the abode of the *yin* principle in its highest perfection.

*Tung te*, it has communication with the sacral extremity of the vertebral column.

*How tung ke*, the larynx, or passage for the breath.

*Yen tung shih*, the pharynx, or passage for the food.

*Shen chung*, the sternal region, or centre of the thorax; it is the space situated between the mammæ, is the seat of the breath, and has the office of envoy or imperial servant; joy and delight emanate from it. It can distinguish between the *yin* and *yang*, and, being the source of change, cannot be injured without danger.

*Fe*, the lungs; they are placed in the thorax, resemble the flower of the water-lily, and are suspended from the spine; they are divided into two portions, and subdivided into six (*ye*) lobes, four being on the left side, and two on the right. There are holes in them, out of which the sound comes; phlegm is produced in them; they are of a white colour, and correspond to metal. They have the office of transmission, and rule the various parts of the body.

*Sin*, the heart, is situated in the thorax, and holds the office of prince, or lord and ruler in the body; the spiritual intelligences (the thoughts) emanate from it.

*Sin paou*, called also *paou lo*, the pericardium; it comes from and envelops the heart, and extends to the kidneys.

*Pe he*, the bond of connection of the spleen.

*Kan he*, the bond of connection of the liver.

*Shin he*, the bond of the connection of the kidneys.

*Wei he*, the œsophagus.

*Kih mo*, the diaphragm, is situated below the heart and lungs, and has its several connections with the spine, the ribs, and bowels; it prevents the fetid exhalations from ascending.

*Kan*, the liver, is placed on the right side; it corresponds with wood, and is of a purple colour; it has seven lobes, and has the office of generalissimo; the *hwan*, or soul, resides in it; schemes and plans emanate from it.

*Tan*, the gall-bladder, is placed below the liver, and projects upwards into it; it has the office of judge; determination and decision proceed from it; when people are angry it ascends or expands.

*Pe*, the spleen, is situated near the stomach, corresponds to earth; it assists in digestion, and is of a yellow colour.

*Wei*, the stomach.

*Fun mun*, the cardiac extremity.

*Yew mun*, the pylorus.

The stomach is connected with the spleen, from which the food passes through the stomach into the large intestines; the spleen and stomach have the office of storing up; the five tastes emanate from them.

*Che man*, the omentum.

*Tse*, the navel.

*Tan teën*, the "vermilion field," or pubic region.

*Seaou chang*, the small intestines, are connected with the heart; the urine passes through them into the bladder, and is then expelled. They have the office of receiving abundance; digestion of the food is carried on in them.

*Lan mun*, the caput coli, is between the small and large intestines. Here a separation of the contents of the intestines takes place; the watery secretions flow hence into the bladder, and the grosser parts or fæces pass down into the large intestines.

*Ta chang*, the large intestines, are connected with the lungs, are situated in the loins, and have sixteen convolutions; they are of a white colour, and have the office of forwarding. Transformation is produced in them.

*Chih chang*, the rectum.

*Kuh toau*, or *kang mun*, the anus.

*Kaou*, or *te*, the sacral extremity.

*Shin*, the kidneys, are situated in the loins; correspond to water, are of a dark colour, and resemble an egg or bean in shape; they have the office of producing power and skill; ingenuity proceeds from them, and the subtle or

generative fluid is eliminated by them; above to the brain and below to the sacral extremity they are the rulers. (The urine is not supposed, by the Chinese, to be produced by these organs, but by the separation of the fluid from the solid parts of the food.)

*Ming mun*, the gate of life; in this plate the *ming mun* is placed between the bladder and rectum, but in other plates the right kidney is called the *ming mun*. It would appear that the right kidney is the *ming mun* in the male, for they ascribe to the kidneys the office of storing up the subtle fluid, while in the female the same name is applied to the uterus.

*Pang kwang*, the bladder, is placed below the kidneys, and is the reservoir of the urine. There is an aperture in the large intestines (namely, the iliac valve), where the excrementitious matters are separated; the fæces go into the large intestines, and the urine into the bladder; this organ has the office of a local magistrate.

*San tseaou*, literally, three passages.

*San tseaou chay, shwuy kuh che taou loo yay.* The exact meaning attached to these *san tseaou* is not very evident, but apparently the Chinese and Japanese attribute all the more obscure functions of the viscera to them; they are supposed to encircle the cavities of the thorax and abdomen, and thus to connect the various viscera together. One description of them is as follows: "They are three in number, the upper, middle, and inferior. The upper one terminates in the superior orifice of the stomach, and governs the ingesta, but not the egesta. The middle one is in the central arch or bend of the stomach, and governs the fermentation and digestion of the food; it sends forth the watery secretions, and elaborates them into the lighter and more subtle fluids, which flow upwards to the lungs, where they are converted into blood, and thus support the animal frame. The lower one commences below the caput coli, and governs the egesta, but not the ingesta." All this is a mere speculation or dream, there being no such organs or functions as those now described. Indeed in the Nan King it is said, "they have a name, but no form or figure."

*Tsing taou;* the remark in the large plates on this passage is, "agitate the heart, the subtle essence is set in motion, the life gate imbibes and takes it up, and the subtle humours of the three *tseaou* are hereby shed forth."

*Neaou taou*, the urethra.

"The twelve offices or functions above enumerated must on no account have their relative connection disturbed, or great injury will assuredly arise in consequence. The emanations or vapours being changed, tears are produced."

The Japanese description of the wood-cut concludes with the following remarks on the fœtus: "It is said of the fœtus, that in the first month it is like a pearly dew-drop; in the second, it resembles a peach flower; in the third, the sexes can be distinguished; in the fourth, the form and figure can be perceived; in the fifth, the flesh and bones can be seen; in the sixth, the hair and down on the skin appear; in the seventh, the *hwan* or soul enters, and the child moves its right hand considerably; in the eighth, the *pih*, or mind enters, and the child moves its left hand; in the ninth, it turns itself over three times; in the tenth, the *ke*, spirit or subtle fluid, enters, and the fœtus is then born."

The purpose for which such communications as the present are made, is not that we may acquire any increase to our present stock of anatomical or medical knowledge, but that we may know exactly what are the ideas which the Chinese themselves have on these subjects, and to ascertain the names they apply to the parts of the human body, the names of diseases to which the body is liable, and the names and qualities of the plants and minerals they use as remedies. And before we can in any wise attempt to improve the state of medical and surgical knowledge among the Chinese, it is of the utmost importance that we first obtain a distinct knowledge of their own opinions and theories, vague and indefinite though most of them be.

It is not to be supposed that all the opinions they entertain on medical subjects are mere nonsense, for some of their works have evidently been written by men possessed of considerable talent, and who have carefully examined into the nature and causes of disease; and the rules and precepts given for the management of some affections are by no means to be despised. Still, the whole system of medicine is very defective; thus disease is supposed to arise in consequence of the fanciful accordance between the viscera, the pulse, metals, earth, colour, sound, &c. being destroyed; and then fever and other disordered actions are produced, and the remedies given are intended to restore the natural harmony between the organs and these elements,—which being accomplished, the health will be recovered. It is requisite, in reading Chinese medical books, to ascertain the accordances which are supposed to exist between the organs and various external objects, otherwise the idea intended to be conveyed to the reader will not be ascertained. It must always be borne in mind that although the Chinese reasoning on physiological subjects is in many cases erroneous, still the language in which those theories are expressed is accurate, and the descriptions, so far as they go, clearly convey the intention of the author. L.

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## Art. II.—ON PATHOLOGY OF THE JOINTS.

Concluded from page 297.

2. *Diseases of the Articular Cartilages.* We pass now to the consideration of the morbid alterations of the articular cartilages, and we come at once upon a fundamental question: Are there any proper diseases of articular cartilage? Are not all those that are so called the results of disease of the adjacent tissues and of the action of their products? The doubtful circumstance on which the answers to these questions must ultimately depend is the organisation, or, to speak more definitely, the vascularity of the cartilages. We will first consider the statements and opinions of those who oppose the vascularity and independent morbid alteration of these tissues, and then express our own opinions and those to which we assent.

The work of Dr. Schumer affords a good summary of the arguments generally advanced by the opponents of the independence of cartilages. The vascularity of articular cartilage might, as he rightly says (p. 11), be determined, 1st, by the flow of blood from a wound of its substance; 2d, by injection; 3d, by microscopic examination; 4th, by the morbid changes, if they are of the kind which cannot occur without vessels. But by none of these means, he and many others affirm, can their vascularity be demonstrated.

That no blood flows when an articular cartilage is wounded we readily admit; but no blood flows when the iris is cut, as in making an artificial pupil, or in any other operation, unless it is torn away from the ciliary ligament. Yet who doubts the vascularity of the iris, or that it is subject to peculiar diseases? And the tissue of articular cartilage is even more adapted for the prevention of hemorrhage from vessels divided in it than that of the iris is; for it is compressed within the limits of the space which by its unrestrained elasticity it would occupy, and, therefore, when it is cut, its particles instantly spring up against each other, and at once close any vessel that may be divided. The evidence of the absence of bleeding from its wounds is therefore valueless; the hemorrhage from a tissue is not directly proportioned to the size of its vessels, but to the circumstances in which they are placed, whether the tissue around them is unyielding or loose, whether and how soon they can contract, &c.

The evidence of injection is equally unsatisfactory. It is, we believe, true that no one has yet succeeded in forcing a coloured fluid into the very

substance of the healthy articular cartilage; but it may be driven into vessels running over its free surface. We have done this in a perfectly healthy joint; but it is much less difficult when, by an inflammation, the synovial membrane covering the cartilage is slightly swollen; injection will then pass in distinct branching vessels derived from the circulus articuli vasculosus, for more than half an inch over the edge of the cartilage, in exactly the same manner as the vessels pass from the conjunctiva over the front of the cornea. Now it is not in the smallest degree probable that these vessels stop suddenly at this distance upon the surface of the cartilage, without passing like those of the cornea (to which they are in other respects so similar,) over the whole surface, and dipping into the substance of the cartilage itself. Nor is it more probable that a dense non-vascular tissue should thus be placed between two vascular surfaces; there is but one instance in the body of a non-vascular organ so situated—the crystalline lens—and we need not say how distant is the analogy drawn between it and an articular cartilage.

In addition to these vessels of the synovial membrane covering the cartilage, we believe that another set exists, which pass vertically from the bone through the little canals, which are so distinct by the pink points that are seen when a slice is cut from the surface of the cartilage of a young animal. These have not indeed been yet injected; but the art of injecting is not yet so perfect that from its negative evidence we can have any right to draw a positive conclusion. The vessels of the healthy cornea have been demonstrated by injection only within the last four years; those of the cartilages of the ribs and larynx within the last ten years; and those of the tendons have only been injected within the last twelve months. The articular cartilages evidently present many more difficulties to injection than these; but there is no reason to believe that they may not yet be surmounted. Till the tissues just mentioned had been injected, their vascularity was denied or doubted by those who are not content with any but visible proofs; but long previously, their morbid changes were sufficient to establish their vascularity to every impartial mind.[1]

That vessels should be invisible when the articular cartilages are examined with the microscope is no wonder; they cannot when empty be discerned by it in many even of the most vascular tissues.

We come, then, lastly, to that which is by far the most interesting and important argument for the existence of an independent morbid action in the cartilages, and that such an action as we cannot conceive to be carried on without blood and blood-vessels,—the changes which they undergo in disease. This subject has been examined experimentally, and especially by Dörner,[2] Gendrin,[3] Cruveilhier,[4] and Schumer, and the general result of their investigations is the impossibility of exciting any evident inflammation in an articular cartilage by any mechanical injury. But it is clear that these cases furnish of themselves the contradiction to the conclusions drawn from them; for no effect was produced by the injury upon the cartilage, although all the other tissues of the joints were vehemently inflamed. Now, if the cartilage were not destroyed by the action of its own vessels, why was it

[1] Since this was written our belief has been most happily confirmed by Mr. Liston's account of his injections of the articular cartilages of diseased joints, in a paper read at the Medico-Chirurgical Society. Of course we can at present only announce the fact; but we may add, that an inspection of the specimens that were exhibited in the society's rooms unequivocally established the author's description of vessels in the very substance of the cartilage. The injections were among the most beautiful we have ever seen; and we cordially congratulate the possessor on having surmounted the greatest difficulty of this art.

[2] De gravioribus quibusdam cartilaginum mutationibus. Tuburg. 1798.

[3] Histoire Anatomique des Inflammations.

[4] Archives Générales de Médicine. Fevr. 1824.

not destroyed by those means to which they ascribe its destruction in common inflammations of joints? The experiments show that in the midst of a most acute inflammation of the synovial membrane, such as is produced by cutting a joint wide open, the cartilages remain for some days unaltered. They, therefore, prove nothing; for they are as strong evidence against the power of any external means produced by synovial inflammation to destroy the cartilages, as they are against the cartilage being able to destroy itself. They only prove that in an acute inflammation of a joint the cartilages are not always ulcerated.

But suppose that by disease, or after an experiment, the cartilage is removed from the head of a bone. What are the means by which that removal has been effected? Softening and solution in the pus or other fluid effused into the joint? Absorption by the surrounding synovial membrane, or a tissue produced from it on purpose? Or independent ulcerative action in the cartilage itself? The first is the common opinion of those who do not receive the third,—the second is that propounded by Mr. Key,[1]—the third is that of Sir B. Brodie and many others, and that which we have now little hesitation in adopting. The first two explanations can be applied only to those cases in which the cartilage is progressively removed from its synovial surface towards the bone; they can have no application in the cases in which its removal is effected in the opposite direction, in which it is, as it were, undermined, and its connection with the bone destroyed. In these latter cases it is by all supposed to be absorbed by granulations produced from the bones; but we shall offer some reasons for doubting the correctness of this view.

First, for the theory of the solution in pus. Schumer relates an experiment in which a portion of cartilage, placed in a suppurating fistulous passage, was found after seven days opaque and yellowish, and half dissolved. But ten such experiments could have no weight against the fact which every one must have had the opportunity of observing, viz. that after pus has remained even for many days in a joint, the cartilages may still be neither softened nor in any other way altered; and that if they are irregular in certain isolated parts of their surface, the parts which still remain attached to the bone are quite firm and polished. This is especially the case in that class of suppurations which occur coincidently in several joints, and which we have already alluded to as sometimes accompanying phlebitis. In these cases, after a joint has been distended for many days with pus, all the evident change in the cartilage is that a portion seems as if it had been chipped out of it with some blunt instrument. The surface that is left, and all the rest of the cartilage, is still firm, of its natural bluish-white colour, and intimately attached to the bone. Now, if pus had the least power of dissolving cartilage in the living body, such facts as these could never be observed; the cartilage in such a suppuration of a joint would be evenly thinned over its whole extent, and that which remained would be soft and loose, and half dissolved, or flocculent and unable to bear the pressure of the finger; but such an appearance is in common inflammation of a joint never seen. Portions of cartilage are always entirely removed; and that which remains possesses a healthy aspect, if not its normal connections.

The theory of Mr. Key, which is in part adopted also by Mr. Adams, is far more ingenious, and is founded on facts of more seeming authority, than this of solution by pus. An admirable criticism of it forms the greater part of the important appendix to the present edition of Sir B. Brodie's treatise. The theory is briefly this: When ulceration of the cartilage ensues as a result of synovial inflammation, the removal of its tissue is effected, not by its own vessels, but by those of a very vascular process of synovial membrane which grows over the border of the cartilage, or by those of a similarly vascular membrane produced from the synovial membrane, and receiving

[1] On the Ulcerative Process in Joints, Medico-Chirurgical Transactions. Vol xviii.

its vessels from it, which spreads over the free surfaces of the cartilages and absorbs them.[1]

The fact upon which this theory is founded is, that in many cases where the synovial surface of a cartilage is grooved, or as Sir B. Brodie happily expresses it, *chiseled* out by ulceration, the depression is found occupied by a process of membrane from its synovial lining, which has a very vascular and fringed border, like one of the "glands of Havers." This Mr. Key believes has absorbed the cartilage by a process analogous to that by which the removal of the sequestrum of cylindrical bones under necrosis takes place. Now, the question of the absorption of dead bone is too long to be entered upon at length here; but we may observe that the experiments of Mr. Gulliver, supported as they are by many facts of constant occurrence, render it certain that a sequestrum separated from its vascular connection is never in any degree absorbed by the surrounding vascular parts, but remains, as the loose fragments of fractures often do, unaltered for months and years. The same experiments render it very doubtful whether a dead portion of bone, even still adhering to living bone, is ever lessened by the absorption of the vessels of another part; much less, then, is it probable that a living tissue, however slightly vascular, should be absorbed by the vessels of another adjacent tissue; nor do we know a single example in which it can be proved that the vessels of one living part or tissue have the smallest share in effecting the ulcerative removal of another. It is evident, therefore, that no imagined analogy to any of these other processes is deducible in favour of Mr. Key's view, for they are themselves, if not opposed to his idea, at least most ambiguous.

Again, it is clear that this assumed mode of ulceration by the action of a destroying growth from the synovial membrane cannot explain all cases; for in many the cartilage is removed when it was opposed to another cartilaginous surface, and in these, and in many more, the ulceration occurs in a part of the articular surface to which no synovial growth could have access, as on the very centre of the patella, on the middle of the condyles, and on the head of the femur not near the ligamentum teres, on the middle of the head of the humerus, &c. From all these parts portions of cartilage are often found removed, while that around them is healthy; so that it is evident that even in some of the cases in which the membranous process does exist, it could only have arrived at the ulcerated part by passing over the healthy surface. But in many of these cases of isolated ulceration, and indeed in the large majority, the synovial membrane has no processes growing from it at all. And it is not in the least probable but that in all these cases the process employed is essentially the same; a single case, therefore, in which a growth from the synovial membrane is not found, though the cartilage is absorbed on its synovial surface, would throw great doubt upon the theory; and when such cases are far from rare, they must be fatal to it. They are so far from rare, that we believe that many surgeons to whom the ulceration of the cartilages is a familiar appearance, have never yet seen such processes from the synovial membrane as Mr. Key describes.

But still this vascular growth is sometimes seen exactly fitting into the cavity in that portion of the articular surface from which the cartilage is removed, and certainly to an imaginative mind it looks just as if it had been eating and growing on the food it derived from the edges of the hollow it had made; it looks like a worm in its hole. How, then, did it get there?

[1] We cannot but remark the singular mode of expression which Mr. Key, reasoning straightway from facts to final causes, adopts in reference to this process; speaking of it as a curative effort of nature, whose object is in these diseases of the joints to produce, as a natural *cure*, anchylosis. This may be, surgically speaking, a cure, because the patient does not die,—yet we scarcely call it a cure, if from inflammation of his eyes a patient loses his sight; and vision is not more a function of the eye than motion is of a joint.

To explain it, the structure of the joints must be considered; they are cavities with firm and scarcely yielding walls, and they admit of no change of volume except with an inversely proportioned alteration in the quantity of their contents. If the cavity of a joint increase in size, more substance must pass into it to fill it; if it decrease in size, something must pass out of it. They are in this respect exactly analogous to the cranium, into whose cavity, if the mass of the brain become smaller by atrophy, or other loss of substance, more fluid must be and always is effused; if the brain become larger, fluid must pass out of the cranium (unless in children in whom the head can expand), and the brain is then found dry, and without fluid either in its ventricles or membranes. There are cases of cerebral disease in which effects are observed exactly analogous to this growth of the synovial membrane into the joints. When, in consequence of an apoplectic effusion, an abscess, or any other disorder in which a portion of the brain is destroyed, the volume of the contents of the cranium is lessened, inasmuch as the size of its cavity remains for the time unaltered, it is certain that either something must be added to the volume of the contents, or that the volume of the cavity must be reduced. The contents of the cavity must exactly fill it, or a vacuum would exist, which we need scarcely say is impossible. The subject is admirably illustrated by some of the cases of atrophy of the brain detailed by the late Dr. Sims, in his paper on that subject, in the 19th volume of the Medico-Chirurgical Transactions: "The chasm occasioned by the atrophied state of the brain," he says, "we observe to be sometimes filled up by serous fluid and by *deposits of bone on the skull*,"—"the hypertrophy which takes place in the bones of the cranium is very frequently confined to the inner surface of the os frontis, in other cases it is more general."—(P. 367.)

There can be no doubt that in the living body, as in inorganic matter, if the size of an air-tight cavity be increased its contents must expand, or if not expansible, must have something added to them to fill the cavity; or if the size of the contents of a cavity be diminished, its walls must fall in. These are the simple principles on which, when in the adult the brain grows larger, the skull grows thinner; and when the brain becomes smaller, the skull becomes thicker, or more fluid than natural is effused within it. To apply the same principles to the disease of the joints now under consideration: a portion of the synovial surface of an articular cartilage is removed by the ulcerative process of its own vessels; what is to fill the space thus produced in the cavity of the joint? In most cases, as in most of atrophy of the brain, fluid (either pus or synovia) is effused in increased quantity; but in some, as in some of atrophy of the brain, the surrounding tissues grow in and fill up the chasm. The process, or as it might be called, the hypertrophy of the synovial membrane, is the exact analogue of the hypertrophy of the bones of the skull.

In this explanation nothing improbable is involved. It is assumed that the first change is the absorption of the cartilage, and that it may be the first is certain, because in some early examined cases it is the *only* change; by such an absorption a vacuum *must* be formed in the joint; and something *must* fill it up; that *something* is either fluid, or an increased growth of synovial membrane, or a newly-formed false membrane. We can indeed determine, if the part of the cartilage absorbed be known, what will be produced to fill its place; if the middle of the surface be ulcerated, fluid will be effused and no membrane produced; if the borders of the cartilage, then membrane grows into the cavity as fast as it is formed.

Thus much of the presumed explanations that have been offered of superficial ulceration of articular cartilages, to remove the apparent difficulty of their possessing too small a degree of vascularity to effect their own ulceration. Neither of them is free from far greater objections than those which they are intended to surmount.

The opinion is more commonly received, and certainly more plausible, that in the deep ulceration in which the cartilage is undermined from its

connection with the bone, the vascular granulations that grow into the hollow between them are the agents by which the absorption of the under surface of the cartilage is effected. But even against this view there are many objections; as the improbability of one tissue being absorbed by the vessels of another, and that healthy bone (for in some though not in most of these cases the bone is found unaltered,) should produce granulations to do such irreparable mischief. It is certain that if the absorption of the under surface of the cartilage were the first step in the process, granulations or something *must* grow from the head of the bone to fill up the cavity that would else be formed; and that the cartilage is first absorbed is rendered probable by the frequent coincidence of similar absorption on its opposite (synovial) surface, which we have already shown is often a primary affection.

The growth of granulations into such a cavity as the independent ulceration of the under surface of the cartilage would form is easily producible at will. If a hole be bored in a bone and the integuments replaced over it for a few days and then again raised, the hole will be found exactly filled by a growth of vascular granulations from the surface of the tissues that lay over it, just as in this case each little cavity on the under side of the cartilage is occupied by a growth of granulations from the subjacent bone.[1] The same action no doubt produces the granulations in both cases, as well as in all those in which granulations appear to be eating away the surface of an ulcerating tissue. In all the growth and increase of the granulations is secondary; a necessary consequence of the removal of adjacent tissues; they do not form the holes, but they grow into the holes that are formed by the tissue's own vessels.

The explanations, then, which the opponents of the independent morbid action of the cartilages have offered, are at present insufficient to account for the phenomena. The removal of cartilage is fairly referrible only to a process of ulceration which is effected by its own power; and even in the absence of any other evidence for their vascularity, this alone might be sufficient proof of it. When to the evidence which it affords we add the proof of the vascularity of their synovial surface,—the occasional appearance of vessels even in their substance when diseased—as in the case described by Mr. Mayo (Med.-Chir. Trans. vol. xix, p. 63,)—the occasional existence of a vascular false membrane passing from the synovial surface of one cartilage to that of another, without any communication with the walls of the joint, and without any apparent vascularity of the adjacent synovial surface,—the peculiarities which it presents in some other diseases,—the weakness of all the objections invented against its vascularity, and all the evident improbabilities of a non-vascular substance existing in such circumstances and presenting such phenomena as cartilage does,—by all these the vascularity and independent power of this tissue may be deemed sufficiently well established to be admitted in the explanation of the various forms of ulceration to which it is subject.

Of all that have been offered, the most concise and correct view of the ulcerations of cartilage is, in our opinion, that which Mr. Mayo has given in the paper just referred to; it is that which with very slight modification we should exactly adopt. There are three kinds of ulceration of articular cartilage: one in which it commences from the synovial surface; a second in which it commences at the surface next the bone,—in both these the substance of the cartilage that remains is white, firm, and scarcely altered in appearance; in the third kind the remaining cartilage is softened, and converted into a fibrous or brush-like substance.

In the first class of cases, which may be called simple superficial ulceration, a portion of the surface of the cartilage looks as if it had been irregu-

[1] This experiment was often performed by Du Hamel; see his Papers on the Reproduction of Bone, in Mém. de l'Acad. des Sciences, 1739-43.

larly chipped or chiseled out; the surface thus exposed retains its natural colour, its firmness, and its polish. When a joint thus affected is opened, it is scarcely imaginable that so little should be left by such formidable symptoms as those by which the disease was accompanied; for sometimes the redness of the synovial inflammation by which this form is accompanied has passed away, and nothing is found but the uneven cartilage. The most common cause of, or at least coincidence with, this kind of ulceration, is intense or long-continued inflammation of the synovial membrane, such as occurs in penetrating wounds of the joints, or in perforation from ulceration, or in the diffuse suppurations met with in phlebitis, or such as are sometimes produced by any of its common causes, as cold, &c. The effusion of pus into the joint is of course the result of the synovitis, and is generally coincident with the ulceration of cartilage; but neither it nor the effusion of lymph are essential to this affection. Most commonly there is also coincident ulceration of the cartilage on the surface next the bone; but in some cases this is absent, and especially, we think, in those which accompany the general and apparently metastatic suppurations in phlebitis; in these the cartilage always retains its firm connection to the bone, and can no more be torn from it than it can in health. When the ulceration in this form has extended down to the bone, it exposes a healthy surface, or one only increased in vascularity; and at any period one may determine that the ulceration commenced on the synovial aspect, by observing that the exposed portion of bone is smaller than the area of the synovial aspect of the ulcer, so that the borders of the ulcer shelve downwards and inwards, and have their thin edges more or less adherent to the bone that is exposed.

In the second kind of ulceration of articular cartilage, which may be called simple deep ulceration, the cartilage is at first removed only on the surface next the bone; it is undermined, and may be torn up from the osseous surface, or is even found hanging from it in pieces, or lying loose in detached portions in the interior of the joint. Its under surface is rough and irregular, as if coarsely worm-eaten; often its whole thickness is perforated, and on opening the joint the cartilage looks riddled with little vascular masses of granulation projecting through its apertures from the bone beneath it.

The exposed surface of bone is highly vascular, and wherever the cartilage is separated, is covered by prominent, soft, and very red granulations, which fit into the cavities on the under surface of the cartilage. It is probably to the pressure of the cartilage on these granulations that the exquisite pain which accompanies this form of the disease may be ascribed. The cartilage itself can scarcely be the source of pain of the character here felt; but the peculiar acuteness of the suffering produced by even lightly touching the granulations from bone is sufficiently well known.

In some cases the bone is evidently softened, and atrophied or ulcerating; but in others it retains all its firmness, and except for an increase in its vascularity, might be deemed healthy. The latter is rarely found in diseased hip-joints; but more commonly in the most acute cases in which ulceration of the cartilages occurs in coincidence with intense synovitis; in chronic cases the disease, commencing with a moderately acute inflammation of the synovial membrane, goes on to affect in turn all the tissues belonging and adjacent to the joint, or it commences in the cartilage, or simultaneously in the bone and cartilage. The ordinary cases of chronic diseased knee-joint are examples of the first kind; those of morbus coxæ, the scrofulous diseases of the hip-joint of young subjects, are instances of the second.

In all these forms of disease, however, and whatever be their origin, their ultimate effects, if unchecked, are disorder and functional destruction of every tissue. The effects of the first stages can be learnt only by the examination of extremely acute cases, and of those in which accidental death has prematurely placed them at our disposal, or by the careful comparison of a great number of advanced cases. From both the result is that the ab-

sorption of cartilage may be the initiative; but that in the majority of cases it is subsequent to inflammation of the synovial membrane.

The third form of ulceration of the cartilages, in which its tissue is converted into a fibrous or brush-like substance, is by far the rarest. It is a chronic disease, and appears to commence on the synovial surface, for the part of the cartilage next to the bone and the bone itself are usually healthy.

We had intended to consider the pathological changes observed in some other forms of diseases of the joints, and to point out the general deductions which the present state of knowledge permits to be drawn from them; but this article has already run its full length, and we must for the present leave the subject.

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## MISCELLANEOUS NOTICE.

*Medical School of the New York University.*—The public prints have announced the re-formation of the medical school of the University of New York; the former professors of which—dissatisfied with the acts of the council—resigned their situations about two years ago, and before even they had entered upon their duties as teachers. The list of the present faculty includes the names of Drs. Paine and Bedford, of the former faculty, and has the additional names of Professors Pattison, Revere, Mott, and Draper. The institution will go into operation in October next.

This arrangement will deprive the Jefferson Medical College of two of its able and zealous teachers. By a singular coincidence, the sudden death of Professor Green and the appointment of his two colleagues to the new university occurred almost simultaneously. We shall part with our friends and colleagues with regret, and with a sincere desire that their exertions may be profitable to themselves and to the profession in the new sphere which they have selected. For ourselves, there has ever been but one rule of thought and of conduct,—founded on a desire to see every honourable association of teachers—no matter where situate—flourish according to their merits; and no paltry inducement of self-aggrandisement has ever led, or could lead, us to interfere by word or deed with their useful labours. A spirit of emulation is of course desirable; but it should be an emulation as to which institution can best promote the dignity of the profession, and, through it, of the community. To effect this, it is never necessary to disparage the efforts of others; whilst it is indispensable to be honourable and energetic ourselves.

With these views, as honestly entertained as they have ever been openly expressed, we desire to see the new university of New York proceed onwards, and at an equal pace with the different elevated medical institutions of the country. The loss to the Jefferson Medical College by the death of Professor Green, and by the secession of Professors Pattison and Revere, is sincerely deplored by us; but we should not express our honest conviction did we say it was irreparable. We are fully satisfied, indeed, that the board of trustees of the institution will look with a single eye to the supplying of the present vacancies in a manner that will add to the harmony, stability, reputation, dignity, and honour of the school; and should such a determination be rigidly carried into effect, they cannot fail to succeed.

## NECROLOGY.

*Professor Green.*—In our last number we announced the death of our estimable friend and colleague in the Jefferson Medical School, and promised a brief notice of his useful career. The following, which appeared in the Saturday Courier of February the 6th, from the pen of a friend of the deceased, is so appropriate that we prefer to copy it:

"The sudden death of Dr. Green, late Professor of Chemistry in the Jefferson Medical School of this city, has cast a gloom over that institution, and throughout a wide circle of friends and relatives. Dr. Green was the son of Dr. Ashbel Green, the eminent and aged Presbyterian clergyman of this city; and for many years was professor of chemistry in Princeton College, New Jersey. After removing to this city, Professor Green, in conjunction with Dr. George M'Clellan and the late Dr. John Eberle, founded the Jefferson Medical College of this city, in which he continued to fill the chemical chair until his death.

"The reputation of Dr. Green as a lecturer was very high, both with his pupils and the public; and his works on Electro-Magnetism, Chemistry, Astronomy, and Trilobites, placed him among the most scientific men of the country. His cabinet of shells, minerals, and coins, was large; and his constant contributions to the scientific journals of the day evinced him a close student, and a sagacious investigator and collector on all subjects to which he turned his attention. The cause of science and literature has by his death sustained a severe loss, and the withdrawal of his services and high reputation from the school with which he was so intimately connected will create a vacancy not easily supplied.

"We learn that on last Sunday night Dr. G. attended church as usual, and appeared in his customary health on retiring to rest. Early in the next morning he complained of a feeling of suffocation, and before Drs. Dunglison or Harris, who were both sent for, and came immediately, could reach him, expired. The cause of his sudden demise proved to be an enlargement and ossification of the heart.

"His funeral took place on last Thursday, and his remains were followed to the grave by a large number of friends, who loved him when living, and mourn him when dead."

The following resolutions are expressive of the feelings of the board of trustees, the faculty, and the students at this sudden dispensation, which has deprived the institution to which he was attached of a zealous and efficient preceptor:

*Jefferson Medical College, February* 4, 1841.

At a special meeting of the board of trustees of Jefferson Medical College, held this day, the following resolutions were unanimously adopted:

Resolved, That this board are deeply sensible of the loss the institution has sustained in the death of Professor Jacob Green, who, during his connection with it, commencing with its origin, executed the duties of his chair with eminent ability and fidelity.

Resolved, That this board entertains for his memory the deepest respect, endeared to them not only by the faithfulness with which he executed his public duties, but by his exemplary deportment in the relations of private life.

Resolved, That this board sincerely sympathise with the bereaved family of Professor Green in the irreparable loss they have sustained, and that a committee consisting of Rev. Dr. Cuyler, the Hon. Edward King, and John R. Jones, be appointed to convey the expression of these feelings to them.

From the minutes. JOHN R. VOGDES, Secretary.

*February* 1*st*, 1841.

A special meeting of the faculty being convened at the college this day, in consequence of the death of Dr. Jacob Green, late Professor of Chemistry in this institution, the following resolutions were adopted:

The professors have heard with grief and deep regret of the sudden death of their beloved and respected colleague.

Resolved, That the lectures be suspended until the day after the funeral; that the professors will attend the obsequies, and that they will wear the customary badge of mourning for the remainder of the session as a testimonial of their friendship and respect for the memory of the deceased.

Resolved, That a copy of these resolutions be enclosed to the family of the deceased, as an expression of the sympathy and condolence of the members of the faculty. JOHN REVERE, M. D., Dean of the Faculty.

*February* 1, 1841.

The melancholy news of the sudden death of Professor Green having been announced this morning, a meeting of the class was immediately convened. The meeting was organised by calling J. P. Woods, of Virginia, to the chair, and appointing J. Stuart Leech, of Pennsylvania, secretary. The chairman having briefly stated the sad and unexpected calamity which had befallen them and the institution at which they are in attendance, it was on motion

Resolved, That a committee of twelve be appointed to draft resolutions expressive of the feelings of the class, occasioned by the sudden bereavement of their much esteemed and endeared professor, Dr. Green.

Whereupon the following gentlemen were appointed said committee:—Messrs. J. A. Chilton, of Va., Wm. H. Scott, Pa., C. A. Harding, Md., S. D. Mullowny, M. D., Mo., Irby Dunklin, S. C., Z. T. Chunn, M. D., Va., John Pattison, Pa., J. F. Gaylord, N. C., A. Hepburn, Pa., R. W. Christy, Pa., Wellington Bird, Pa., G. T. Mason, Va.; and on motion the chairman and secretary were added to the number. The committe reported the following resolutions, which were adopted:

Resolved, That the death of our esteemed teacher has been heard with the deepest regret and sorrow, and that we lament most sincerely the loss thus occasioned to his family, to society, and to science.

Resolved, That his kind and gentlemanly manners, which secured to him the warmest affection of his class; his generous friendship, which attached his numerous students to him with a feeling akin to filial love; and his scientific attainments, which have ever commanded for him a high place in public estimation, are stamped upon our memories with too deep an impression ever to be effaced, so long as virtue is honoured, friendship cherished, and knowledge admired.

Resolved, That we duly appreciate the loss sustained by the college in his death, and lament the vacancy in the faculty thereby occasioned.

Resolved, That our deepest condolence is tendered to the sorrowing family of the deceased, with an assurance that although no tie of relationship existed, our hearts respond to their anguish in melancholy submission to the will of Him who rules in wisdom and in mercy.

Resolved, That the dean of the faculty be requested to transmit a copy of these resolutions to the family.

Resolved, That as a testimony of respect and sorrow, the class wear crape on the left arm during the remainder of the present session.

Resolved, That we will meet at the college on Thursday, at 2½ o'clock, P. M., and proceed thence in procession to attend the funeral obsequies of our lamented friend and professor.

Resolved, That the proceedings of this meeting be published.

J. P. WOODS, Chairman.

J. Stuart Leech, Secretary.